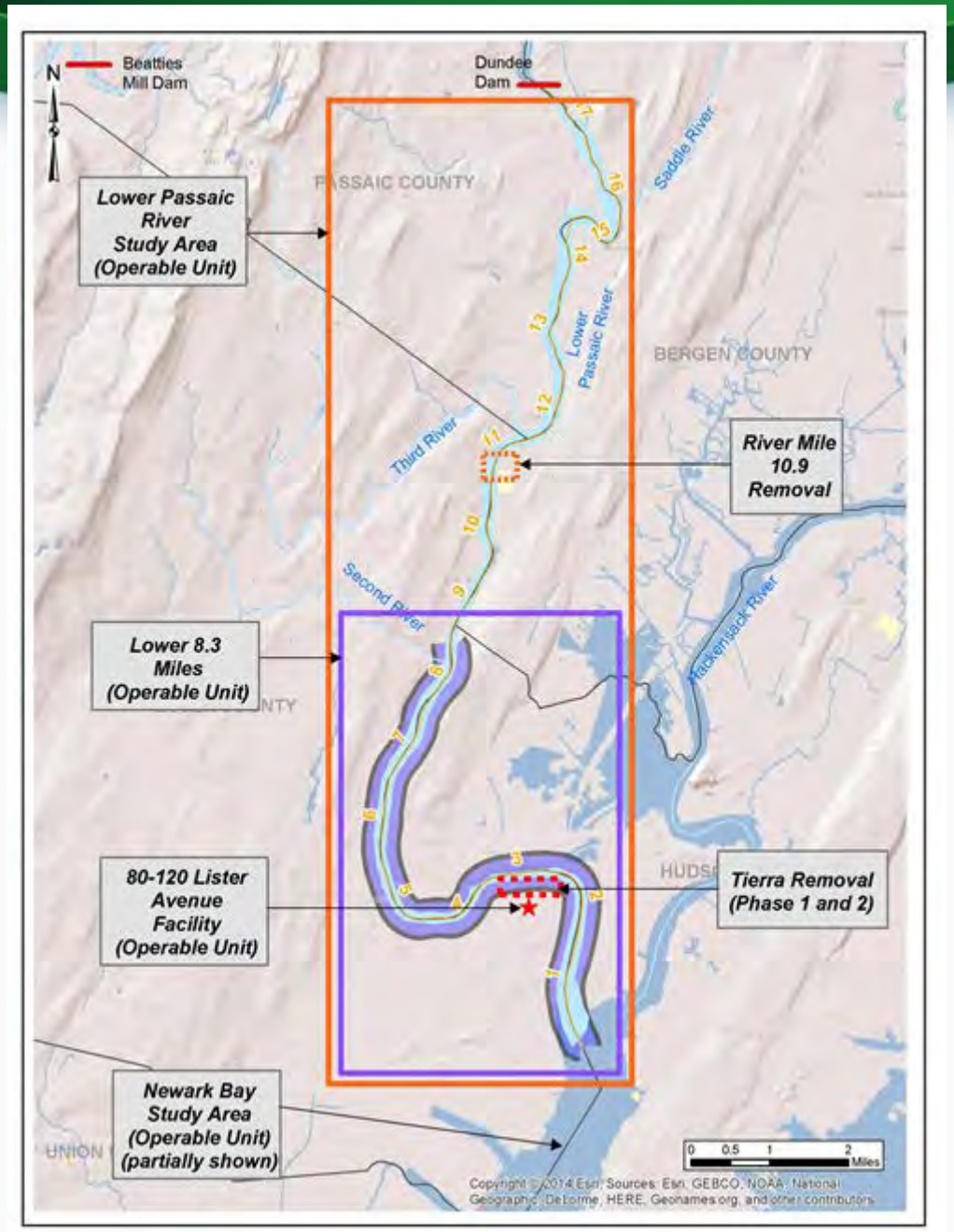
Lower Passaic River Study Area

17-mile Remedial Investigation/ Feasibility Study

Update for Community Advisory Group

February 8, 2018

501318



Diamond Alkali Superfund Site Overview:

- 80-120 Lister Avenue
- Lower 8.3 miles of the Lower Passaic River
- Newark Bay Study Area
- 17-Mile Lower Passaic River Study Area

Timeline Refresher

2004 to 2007: EPA RI/FS sampling of 17-miles

2007: CPG agrees to take over on-going 17-Mile RI/FS

2008 to 2014: CPG conducts RI sampling

2014 to now: data evaluations, analysis, report prep

RI Field Investigations Included:

- Bathymetry Surveys
- Water Column Sampling
- Sediment Sampling
- Biological Sampling

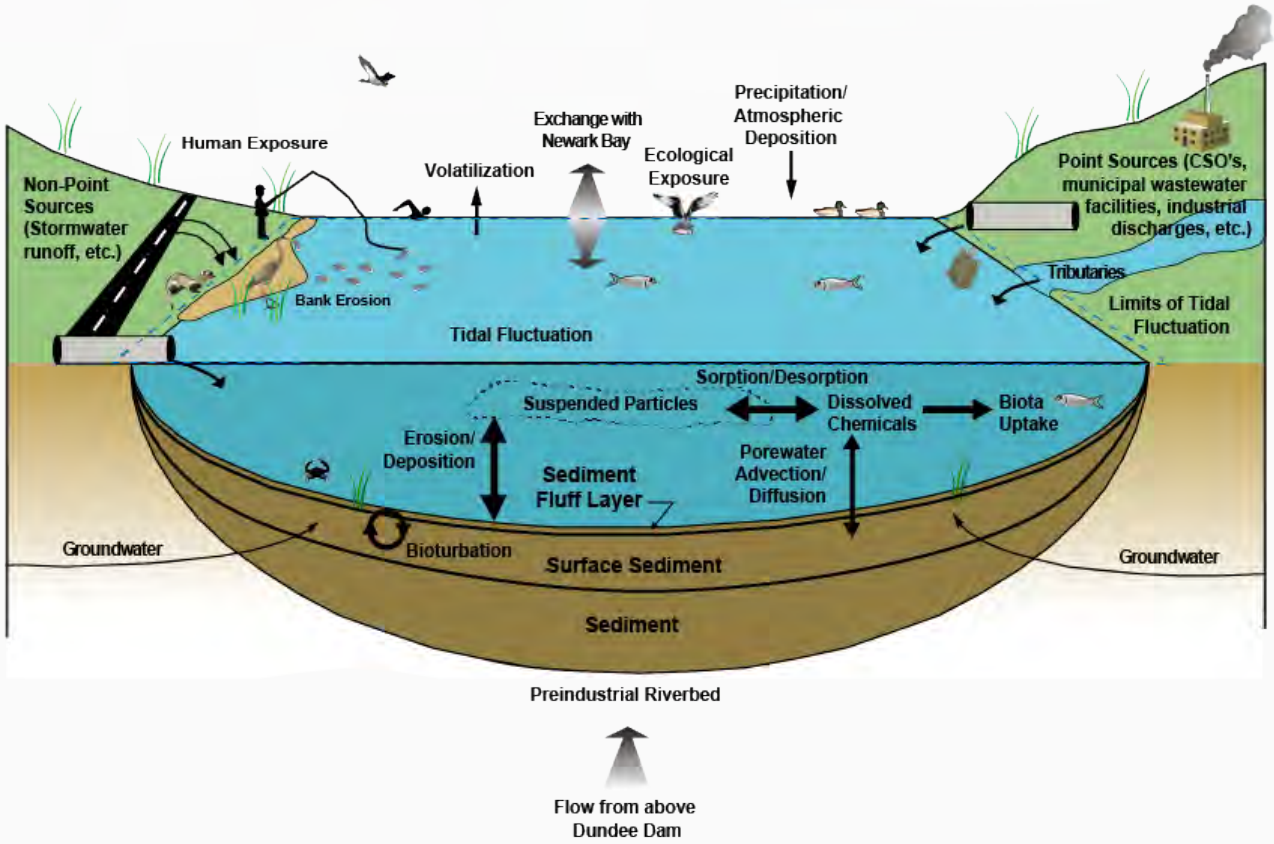
RI = Remedial Investigation
FS = Feasibility Study
CPG= Cooperating Parties Group

Conceptual Site Model (CSM)

A CSM is an important tool used in the Superfund process to identify:

- sources,
- receptors,
- pathways,
- and to understand & support site decisions

Source: Modified from U.S. EPA - Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, December 2005

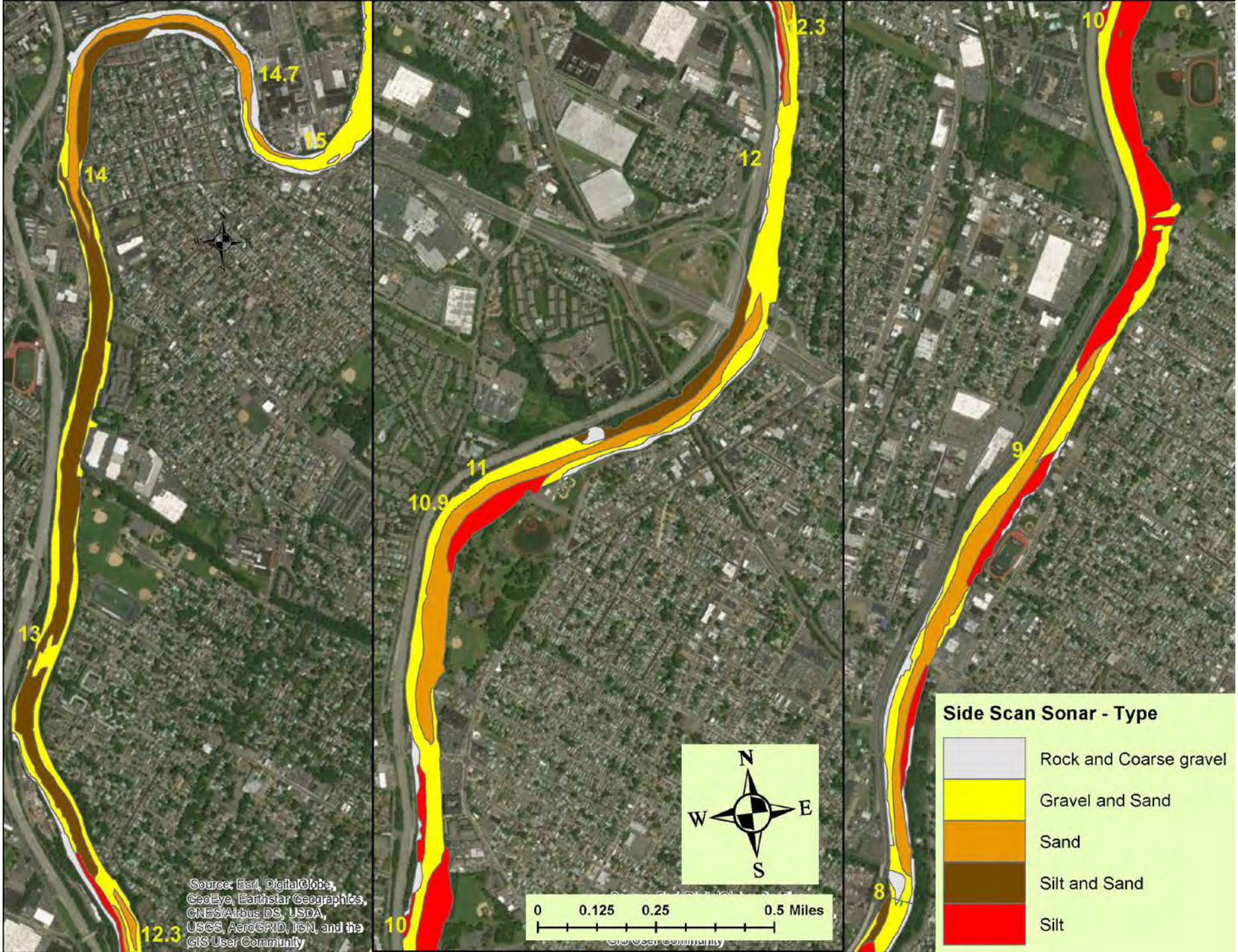


Based on the RI sampling, and building on the conceptual site model described in EPA's Record of Decision for the lower 8.3 miles, we learned…

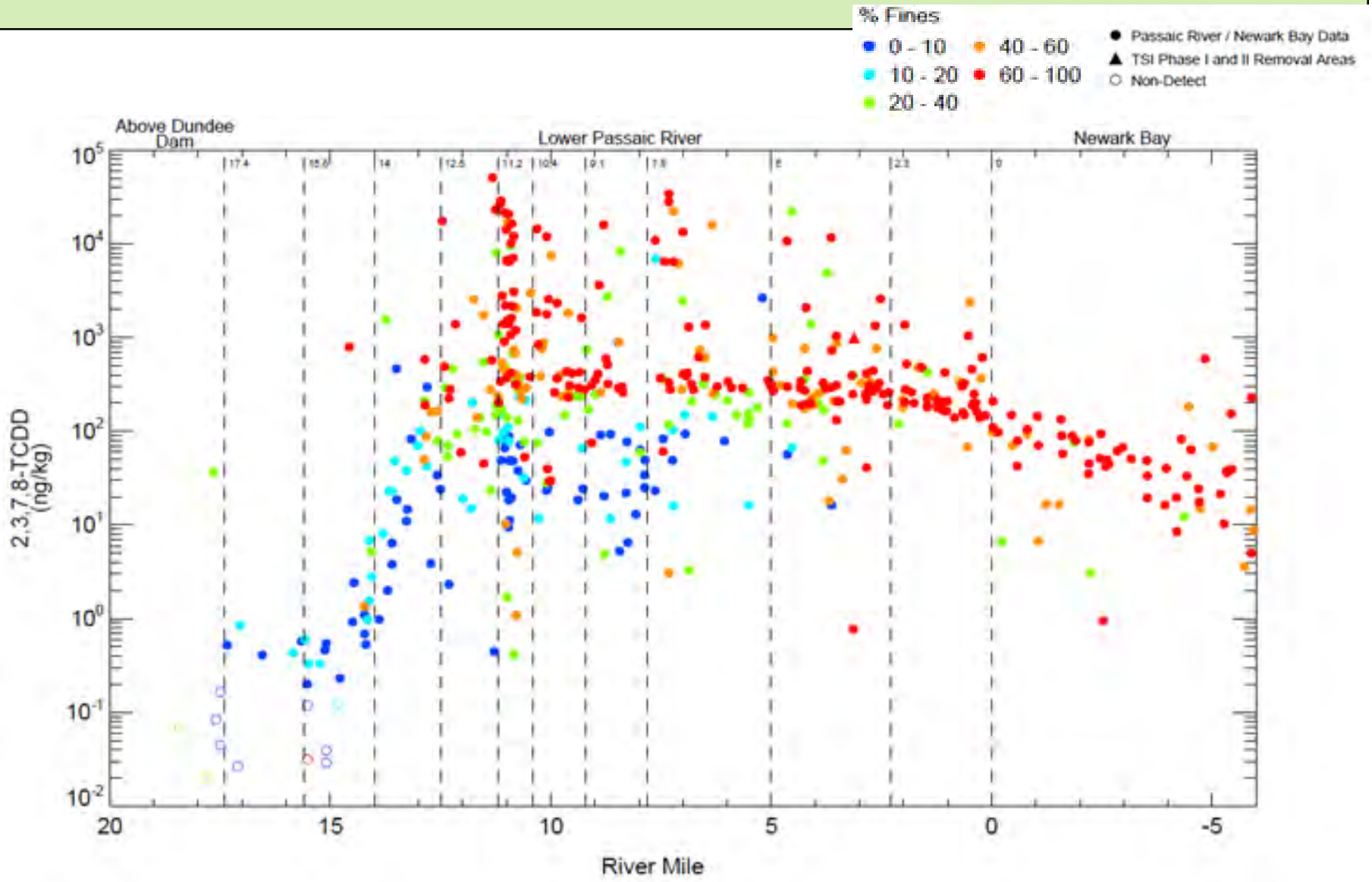
- Contaminant concentrations in the Lower Passaic River are largely driven by variations in sediment type and depositional/erosional history
- Primary Contaminants of Potential Concern ("COPC"):
  - 2,3,7,8- TCDD (dioxin)
  - PCBs
  - Total DDx (pesticide)
  - PAHs
  - Mercury
- Greatest concentration of COPCs are generally found in fine-grained sediments

2,3,7,8-TCDD (ng/kg)	All Depths		Surface (0 to 6 in.)		
	Max	Min	Max	Min	Mean
RM0 to 17.4	9,410,000	0.01	51,100	0.12	1,813
Upper 9 Miles	57,176	0.01	51,100	0.42	2,248

Total PCBs (mg/kg)	All Depths		Surface (0 to 6 in.)		
	Max	Min	Max	Min	Mean
RM0 to 17.4	132.9	0.00	33.9	0.002	2.5
Upper 9 Miles	35.3	0.00	33.9	0.002	3.1


14.7
15
14
13
12.3
2.3
12
11
10.9
10
10
9
8
N
W
E
S
0
0.125
0.25
0.5 Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Side Scan Sonar - Type
Rock and Coarse gravel
Gravel and Sand
Sand
Silt and Sand
Silt

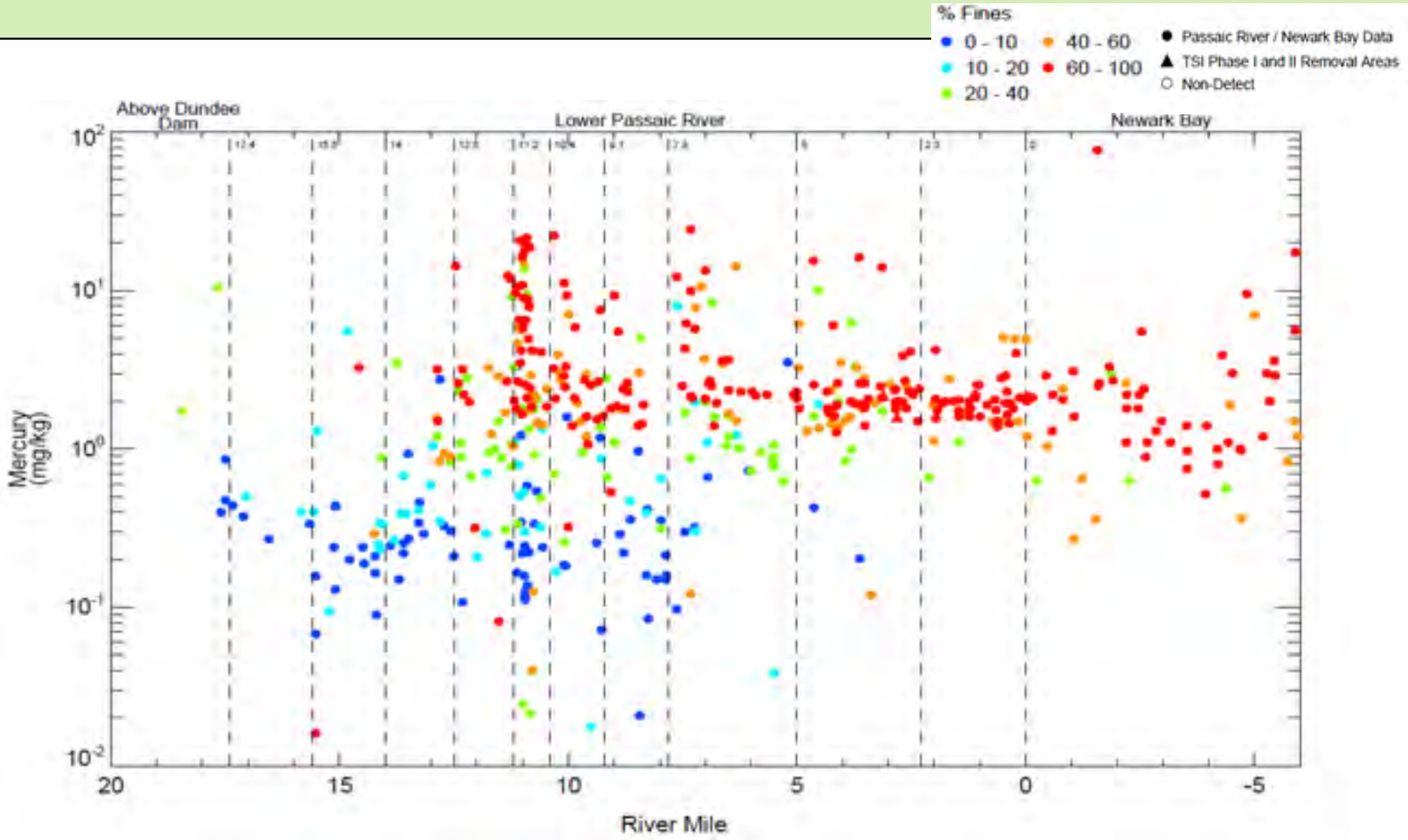
High concentrations of 2,3,7,8 – TCDD, PCBs, total DDx and to a lesser extent Mercury are found in fine-grained sediment.



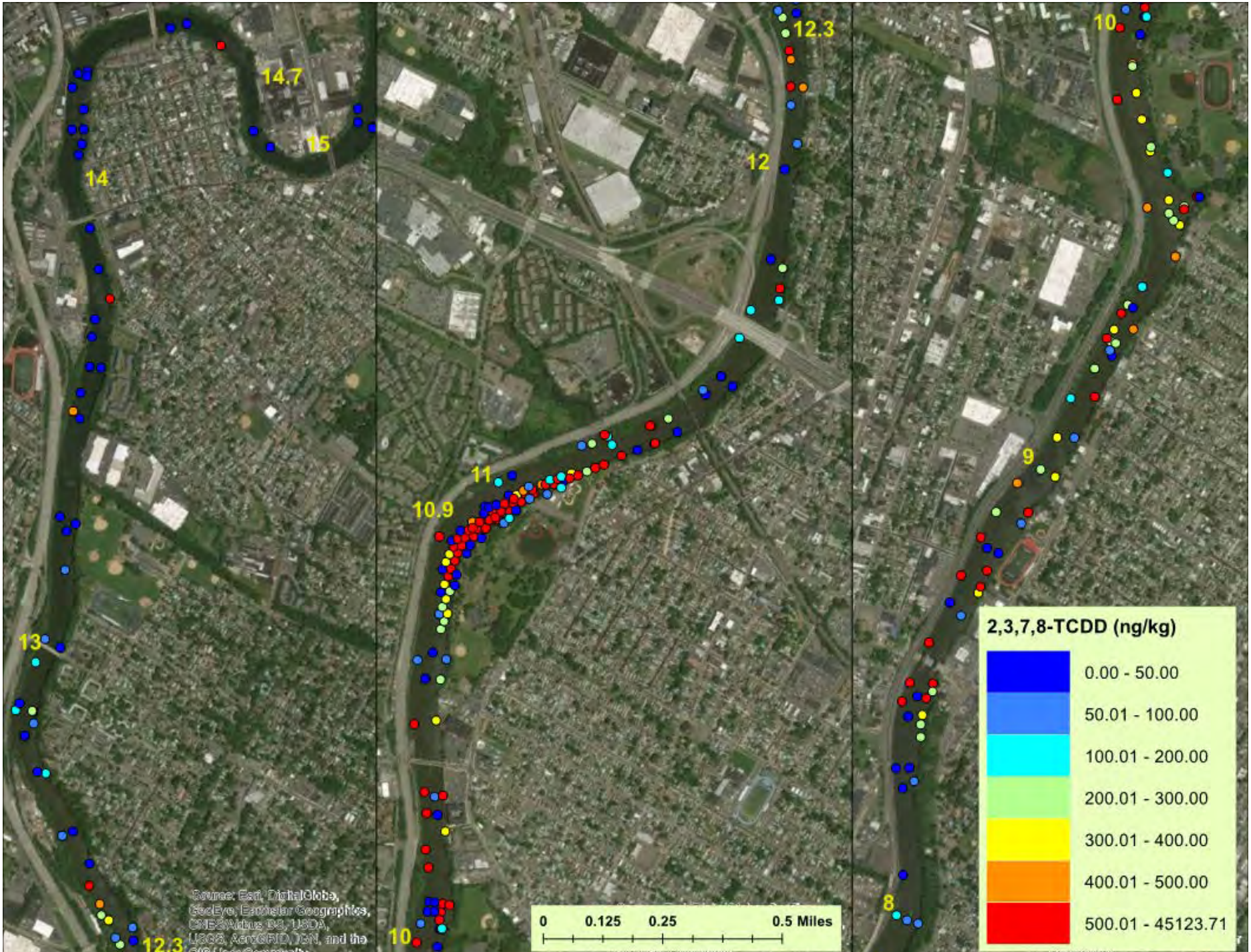
Spatial Pattern of surface sediment 2,3,7,8-TCDD concentrations in relation to fine sediment content (Source: LPRSA Draft RI Report, 12/17 (Anchor QEA, in preparation)

All of the contaminants remain at high concentrations in the river because of legacy sources.

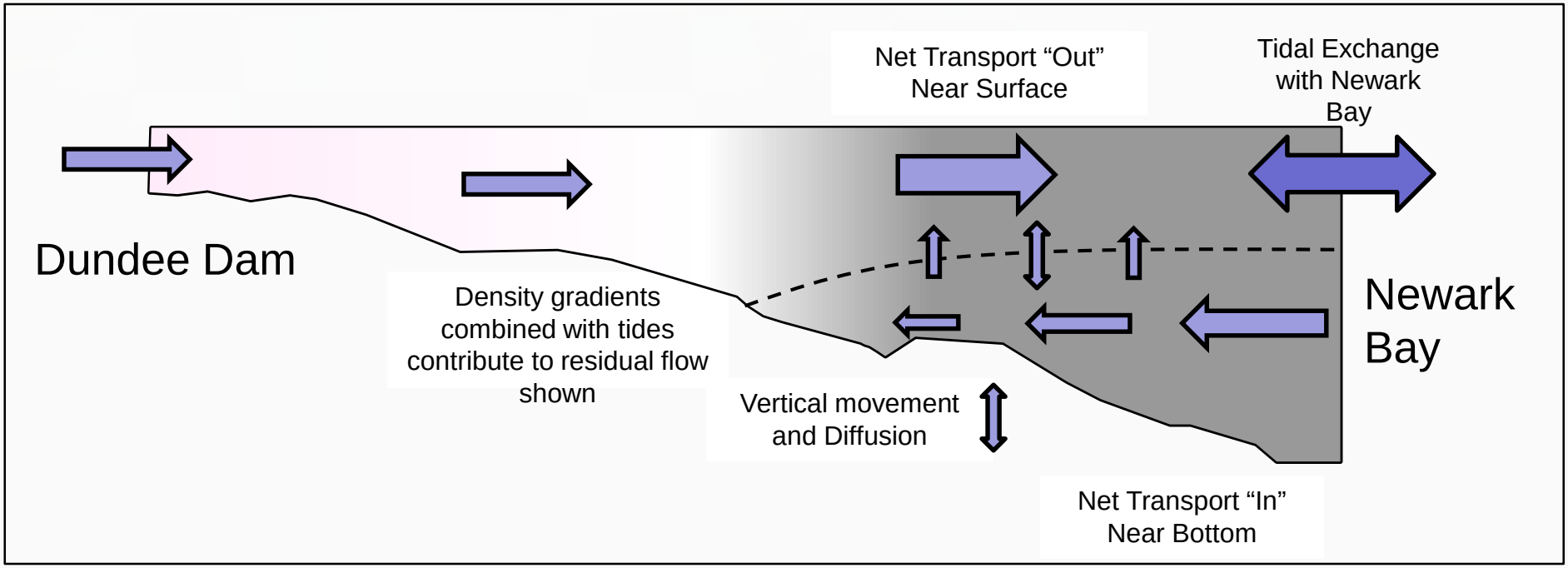
Contaminants such as PAHs, mercury and to some extent PCBs are also influenced by upstream, downstream and/or watershed sources, while dioxin is not.



Spatial Pattern of surface sediment mercury concentrations in relation to fine sediment content (Source: LPRSA Draft RI Report, 12/17 (Anchor QEA, in preparation)


14.7
15
14
13
12.3
10
12.3
12
11
10.9
10
9
8
2,3,7,8-TCDD (ng/kg)
0.00 - 50.00
50.01 - 100.00
100.01 - 200.00
200.01 - 300.00
300.01 - 400.00
400.01 - 500.00
500.01 - 45123.71
0
0.125
0.25
0.5 Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the

Example of Water Circulation in the Lower Passaic River

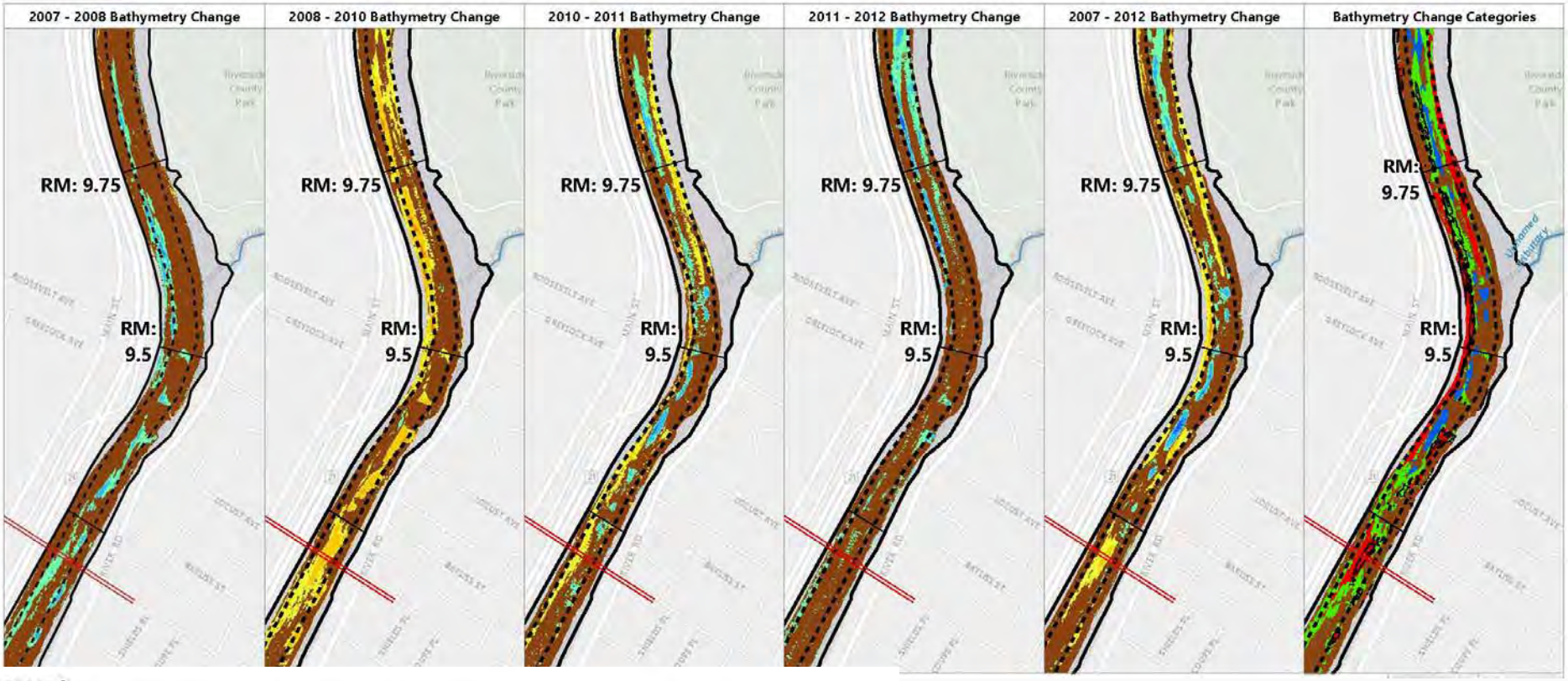


We also learned:

- Contaminated sediments may serve as a source to the water column, and therefore other areas of the river, when concentrations in the sediments are higher than the concentrations found on particles in the water column

- Contaminated sediments can be a source through resuspension from tidal influences or high flow events such as storms

Bathymetry Evaluation – Erosion and Deposition over time



Legend:

- Subreach Boundary
- Navigational Channel
- Shoreline

Bathymetry Change (feet)

- >5
- 2 - 5
- 1 - 2
- 0.5 - 1
- -0.5 - 0.5
- -1 - -0.5
- -2 - -1
- -5 - -2
- <-5

Bathymetric Change Categories

- Depositional from 2007 to 2012
- No Change / Temporarily Depositional
- Erosion and Deposition
- Erosional from 2007 to 2012
- > 1.5 feet of Erosion

NOTE(S):
Positive bathymetry change indicates deposition denoted in blue.
Negative numbers indicate erosion denoted in red.
Shoal bathymetry derived from single beam data for 2007, 2011 and 2012.

Source: LPRSA Draft RI Report, 12/17 (Anchor QEA, in preparation

Conceptual Site Model

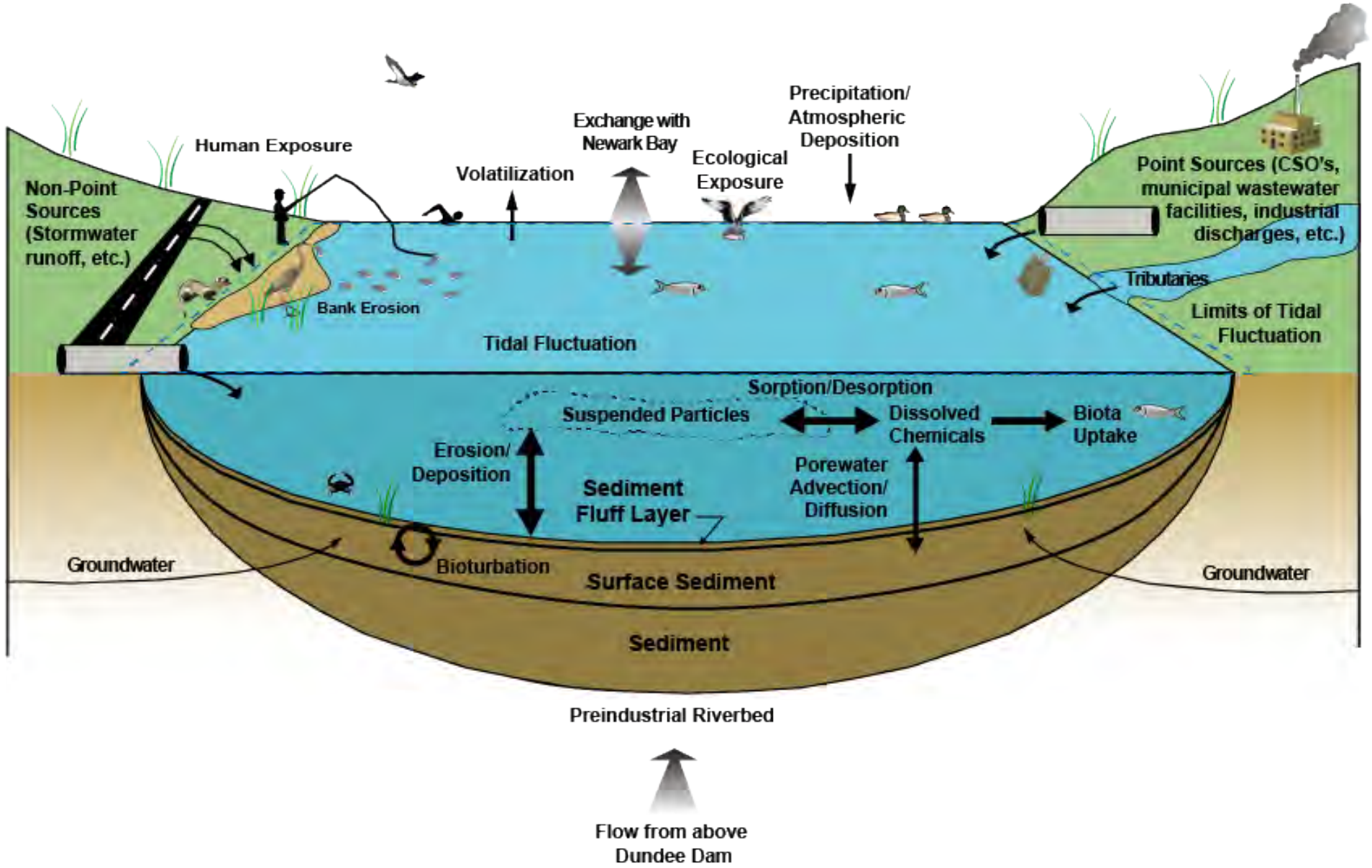


Figure is modified from U.S. EPA – Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, December 2005

Summary of Human Health Risk Assessment Conclusions

Human health risks are driven primarily by ingestion of dioxin and PCBs in fish or crabs

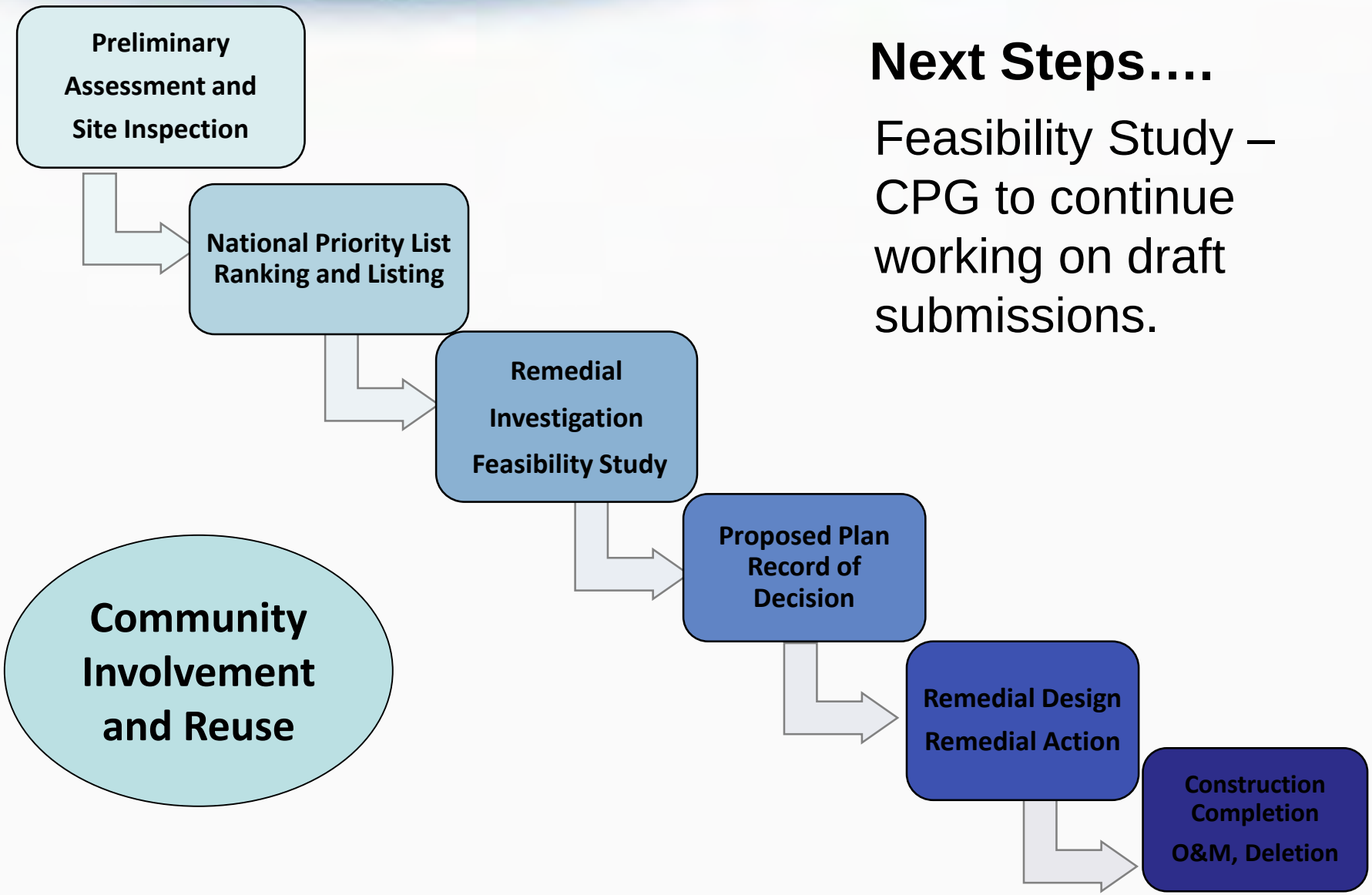
- Some of these risks are also elevated in background fish and crabs
- Fish ingestion risks were estimated assuming a mixed fish diet of: common carp, white perch, American eel, catfish, and largemouth/smallmouth bass
- Maximum total Reasonable Maximum Exposure ("RME") cancer risk of $4x10^{-3}$
  - Acceptable range is $1 x10^{-4}$ to $1x10^{-6}$
- Noncancer hazard of 200
  - Hazard index less than or equal to 1

Ecological Risk

- Revised Draft Baseline Ecological Risk Assessment submitted 12/17
- Preliminary findings currently under review by EPA:

  - **Benthic invertebrates** (including crabs and mussels) are at risk from elevated dioxins, PCBs, PAHs, pesticides, and metals in sediment.
  - **Fish** (omnivores, invertivores, and piscivores) are at risk through fish tissue, fish eggs, dietary dose, and surface water exposure to dioxins, PCBs, pesticides, and metals in surface water.
  - **Birds** (sandpiper, heron, and kingfisher) are at risk through dietary dose and egg tissue exposure to dioxins, PCBs, PAHs, pesticides, and metals in sediment.
  - **Mammals** (river otter and mink) are at risk through dietary dose exposure to dioxins, and PCBs in sediment.

Superfund Process



Next Steps….

Feasibility Study – CPG to continue working on draft submissions.